Chapter 39

Endocrine and Reproductive Systems

Section 39–1 The Endocrine System (pages 997–1002)
This section describes the function of the endocrine system and explains how it maintains homeostasis.

Introduction (page 997)
1. What makes up the endocrine system? The endocrine system is made up of glands that release their products into the bloodstream.
2. What do the products of the endocrine system do? They broadcast messages throughout the body.

Hormones (page 997)
3. Chemicals that travel through the bloodstream and affect the activities of other cells are called hormones.
4. How do hormones affect the activities of other cells? Hormones bind to specific chemical receptors on other cells.
5. Cells that have receptors for a particular hormone are referred to as target cells.
6. Is the following sentence true or false? Cells without receptors are not affected by hormones. true
7. Is the following sentence true or false? Generally, the body’s responses to hormones are quicker and shorter lasting than the responses to nerve impulses. false

Glands (page 998)
8. An organ that produces and releases a substance, or a secretion, is called a(an) gland.
9. Complete the Venn diagram by adding titles.

 Exocrine gland                  Endocrine gland

 Releases secretions into ducts Releases secretions Releases secretions into blood

10. What is the function of the parathyroid glands? Their function is to regulate the level of calcium in the blood.
Match the endocrine gland with the hormone it produces.

<table>
<thead>
<tr>
<th>Endocrine Gland</th>
<th>Hormone It Produces</th>
</tr>
</thead>
<tbody>
<tr>
<td>b 11. Pineal</td>
<td>a. Glucagon</td>
</tr>
<tr>
<td>d 12. Thyroid</td>
<td>b. Melatonin</td>
</tr>
<tr>
<td>a 13. Pancreas</td>
<td>c. Epinephrine</td>
</tr>
<tr>
<td>e 14. Thymus</td>
<td>d. Thyroxine</td>
</tr>
<tr>
<td>c 15. Adrenal</td>
<td>e. Thymosin</td>
</tr>
<tr>
<td>g 16. Ovary</td>
<td>f. Testosterone</td>
</tr>
<tr>
<td>f 17. Testis</td>
<td>g. Estrogen</td>
</tr>
</tbody>
</table>

18. The hormone that regulates metabolism is **thyroxine**.

**Hormone Action (page 999)**

19. List the two general groups into which hormones fall.
   a. Steroid hormones
   b. Nonsteroid hormones

20. Circle the letter of each sentence that is true about steroid hormones.
   a. They are lipids.
   b. They cannot cross cell membranes.
   c. They regulate gene expression.
   d. They can enter the nucleus.

21. Is the following sentence true or false? Steroid hormones are produced from cholesterol. **true**

22. Circle the letter of each sentence that is true about nonsteroid hormones.
   a. They are proteins, peptides, or amino acids.
   b. They can cross cell membranes.
   c. They rely on secondary messengers.
   d. They cannot enter the nucleus.

23. Is the following sentence true or false? Secondary messengers may include calcium, cAMP, nucleotides, and fatty acids. **true**

**Prostaglandins (page 1000)**

24. Hormonelike substances produced by other kinds of cells and tissues are called **prostaglandins**.

25. Why are prostaglandins known as “local hormones”? **They generally affect only nearby cells and tissues.**

26. Is the following sentence true or false? Some prostaglandins cause smooth muscles to contract. **true**
Chapter 39, Endocrine and Reproductive Systems (continued)

Control of the Endocrine System (pages 1000–1001)

27. When does feedback inhibition occur? It occurs when an increase in any substance “feeds back” to inhibit the process that produced the substance in the first place.

28. Fill in the missing labels in the diagram to show how the thyroid gland is regulated by feedback controls.

![Thyroid Hormone Regulation Diagram]

29. Circle the letter of each event that occurs when core body temperature begins to drop.
   a. The hypothalamus produces less TRH.
   b. More TSH is released.
   c. Less thyroxine is released.
   d. Metabolic activity increases.

30. Is the following sentence true or false? As you lose water, the concentration of dissolved materials in the blood falls. ___________false__________

Complementary Hormone Action (page 1002)

31. What is complementary hormone action? It refers to the joint control of part of the body’s internal environment by two hormones with opposite effects.

32. Is the following sentence true or false? Calcitonin increases the concentration of calcium in the blood. ___________false__________

33. If calcium levels drop too low, the parathyroid glands release PTH.

34. How does PTH increase calcium levels? PTH stimulates the intestine to absorb more calcium from food, causes the kidneys to retain more calcium, and stimulates bone cells to release some of the calcium stored in bone.

35. Why is the regulation of calcium levels so important? If calcium levels drop below their normal range, blood cannot clot, muscles cannot contract, and transport across cell membranes may fail.
Section 39–2 Human Endocrine Glands (pages 1003–1008)
This section describes the functions of the major endocrine glands.

Introduction (page 1003)
1. List the seven major glands of the endocrine system.
   a. Pituitary gland
   b. Hypothalamus
   c. Thyroid gland
   d. Parathyroid glands
   e. Adrenal glands
   f. Pancreas
   g. Reproductive glands

Pituitary Gland (page 1003)
2. Describe the pituitary gland and its location. The pituitary gland is a bean-sized structure that dangles on a slender stalk of tissue at the base of the skull.

3. List the two parts of the pituitary gland.
   a. Anterior pituitary
   b. Posterior pituitary

4. In general, what is the role of pituitary gland hormones? They directly regulate many body functions and control the actions of several other endocrine glands.

Hypothalamus (page 1004)
5. Is the following sentence true or false? The hypothalamus controls the secretions of the pituitary gland. _______true_______

6. What influences the activity of the hypothalamus? Its activity is influenced by the levels of hormones in the blood and by sensory information collected by other parts of the nervous system.

7. In what way is the posterior pituitary an extension of the hypothalamus? The cell bodies of the neurosecretory cells of the posterior pituitary are in the hypothalamus.

8. Is the following sentence true or false? The hypothalamus has direct control of the anterior pituitary. _______false_______

Match each pituitary hormone with its action.

- e 9. ADH
- b 10. FSH
- a 11. LH
- d 12. GH
- c 13. ACTH

- a. Stimulates ovaries and testes
- b. Stimulates production of eggs and sperm
- c. Stimulates release of hormones from adrenal cortex
- d. Stimulates protein synthesis and growth in cells
- e. Stimulates the kidneys to reabsorb water
14. What are releasing hormones, and what do they do? They are hormones produced by the hypothalamus and secreted directly into blood vessels. They are carried by the circulatory system to the anterior pituitary, where they control the production and release of hormones.

**Thyroid Gland** (page 1005)

15. Where is the thyroid gland located? It is located at the base of the neck and wraps around the upper part of the trachea.

16. Is the following sentence true or false? The thyroid gland regulates reproduction. False

17. List the two hormones produced by the thyroid.
   a. Thyroxine
   b. Calcitonin

18. What does thyroxine do in the body? It regulates metabolic rates of nearly all the cells of the body.

19. Production of too much thyroxine leads to a condition called hyperthyroidism.

20. Circle the letter of each choice that is a symptom of too much thyroxine.
   a. nervousness
   b. weight loss
   c. lack of energy
   d. goiter

21. An enlargement of the thyroid gland is called a(an) goiter.

22. Infants who lack enough iodine to produce normal amounts of thyroxine suffer from a condition called cretinism.

23. How can cretinism usually be prevented? It can usually be prevented by the addition of small amounts of iodine to table salt or other items in the food supply.

**Parathyroid Glands** (page 1005)

24. How does parathyroid hormone regulate calcium levels in the blood? It increases the reabsorption of calcium in the kidneys and the uptake of calcium from the digestive system.

**Adrenal Glands** (page 1006)

25. What is the general role of the adrenal glands? The general role is to help the body prepare for and deal with stress.

26. The outer part of the adrenal gland is called the adrenal cortex, and the inner part is called the adrenal medulla.
27. Complete the compare-and-contrast table.

**HORMONES OF THE ADRENAL GLAND**

<table>
<thead>
<tr>
<th>Part of Adrenal Gland</th>
<th>Hormones It Produces</th>
<th>Role of the Hormones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adrenal cortex</td>
<td>Corticosteroids</td>
<td>Regulating minerals, metabolism</td>
</tr>
<tr>
<td>Adrenal medulla</td>
<td>Epinephrine, norepinephrine</td>
<td>Producing “fight or flight” response</td>
</tr>
</tbody>
</table>

28. Is the following sentence true or false? The release of hormones from the adrenal medulla is regulated by the sympathetic nervous system. __________ true

**Pancreas** (pages 1007–1008)

29. Is the following sentence true or false? The pancreas is both an endocrine gland and an exocrine gland. ______ true

30. What is the role of insulin and glucagon? **They help to keep the level of glucose in the** blood stable.

31. When the pancreas produces too little insulin, a condition known as ______ diabetes mellitus ______ occurs.

32. Is the following sentence true or false? Type I diabetes most commonly develops in people before the age of 15. ______ true

33. Circle the letter of each sentence that is true about Type II diabetes.
   
   a. It most commonly develops before age 40.
   
   b. It is not due to lack of insulin.
   
   c. It is also called juvenile-onset diabetes.
   
   d. It requires daily insulin injections.

**Reproductive Glands** (page 1008)

34. List the two important functions served by the gonads.
   
   a. **Production of gametes**
   
   b. **Secretions of sex hormones**

35. The female gonads are the ______ ovaries ______, and the male gonads are the ______ testes ______.

**Reading Skill Practice**

Taking notes can help you identify and remember the most important information in a section. Take notes on Section 39–2 by writing the main headings and under each heading listing the most important points. Do your work on a separate sheet of paper.

Students should list all the headings and under each heading add enough additional information to make the topic clear and informative.
Section 39–3 The Reproductive System (pages 1009–1015)

This section explains the roles of the male and female reproductive systems. It also describes the four phases of the menstrual cycle.

Sexual Development (pages 1009–1010)

1. Circle the letter of each sentence that is true about sexual development before birth.
   a. Testes and ovaries begin to develop during the first six weeks.
   b. Male and female reproductive organs develop from the same tissues in the embryo.
   c. The testes produce androgens, and the ovaries produce estrogen.
   d. Hormones determine whether the embryo will develop into a male or a female.

2. What is puberty? Puberty is a period of rapid growth and sexual maturation during which the reproductive system becomes fully functional.

3. How does the hypothalamus begin puberty? It signals the pituitary to produce increased levels of FSH and LH, which affect the gonads.

The Male Reproductive System (pages 1010–1011)

4. Is the following sentence true or false? The release of FSH and LH stimulates cells in the testes to produce testosterone.
   True

5. List three secondary sex characteristics that appear in males at puberty.
   a. Growth of facial and body hair
   b. Increase in body size
   c. Deepening of the voice

6. Circle the letter of each term that refers to a structure of the male reproductive system.
   a. testes
   b. Fallopian tube
   c. vas deferens
   d. urethra

7. The testes are contained in a sac called the scrotum.

8. Why do the testes remain outside the body cavity? The temperature is lower outside the body cavity, and lower temperature is important for proper sperm development.

9. Is the following sentence true or false? Sperm are produced in the vas deferens. False
10. Label the drawing of a sperm with the following structures: head, nucleus, midpiece, and tail.

![Sperm diagram]

11. The structure in which sperm fully mature and are stored is the ______ epididymis ______.

12. The tube that leads to the outside of the body through the penis is the ______ urethra ______.

13. A nutrient-rich fluid called seminal fluid, when combined with sperm, forms ______ semen ______.

The Female Reproductive System (pages 1012–1013)

14. List three secondary sex characteristics that develop in females at puberty.
   a. Development of the reproductive system
   b. Widening of the hips
   c. Development of the breasts

15. Circle the letter of each choice that is a structure of the female reproductive system.
   a. ovary     b. epididymis  c. uterus     d. vagina

16. Is the following sentence true or false? The ovaries usually produce only one mature ovum each month. ______ true ______

17. Clusters of cells surrounding a single egg are called primary ______ follicles ______.

18. The hormone that stimulates a follicle to grow and mature each month is ______ FSH ______.

19. Is the following sentence true or false? Fertilization takes place in the uterus. ______ false ______

The Menstrual Cycle (pages 1013–1015)

20. Circle the letter of each sentence that is true about the menstrual cycle.
   a. It lasts an average of 3 to 7 days.
   b. It is controlled by hormones.
   c. It prepares the uterus to receive an egg.
   d. It has four phases.
Chapter 39, Endocrine and Reproductive Systems (continued)

Match each phase of the menstrual cycle with the event that occurs then.

<table>
<thead>
<tr>
<th>Menstrual Phase</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. Luteal phase</td>
<td>c. Lining of uterus is shed.</td>
</tr>
<tr>
<td>24. Menstruation</td>
<td>d. Egg is released from ovary.</td>
</tr>
</tbody>
</table>

25. Is the following sentence true or false? The level of estrogen falls during the follicular phase of the menstrual cycle. 
   ___________ false ___________

26. During the luteal phase, the follicle turns yellow and is now known as the _______ corpus luteum _______.

27. Is the following sentence true or false? The chances that an egg will be fertilized are the greatest during the first two days of the luteal phase. _______ true _______.

28. What triggers menstruation to occur? Declining levels of estrogen trigger menstruation.

29. Is the following sentence true or false? A new cycle begins with the last day of menstruation. _______ false _______.

Section 39–4 Fertilization and Development (pages 1016–1022)

This section describes fertilization and explains the function of the placenta.

Fertilization (page 1016)

1. The process of a sperm joining an egg is called _______ fertilization _______.

2. Is the following sentence true or false? A fertilized egg is known as a zygote. _______ true _______.

3. After a fertilized egg divides to form two cells, it is called a(an) _______ embryo _______.

Early Development (pages 1017–1019)

Match each term with its definition.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>b.</td>
<td>4. Morula a. Organ that nourishes the embryo</td>
</tr>
<tr>
<td>c.</td>
<td>5. Blastocyst b. Name of embryo when it is a solid ball of about 50 cells</td>
</tr>
<tr>
<td>e.</td>
<td>6. Implantation c. Name of embryo when it is a hollow ball of cells</td>
</tr>
<tr>
<td>f.</td>
<td>7. Gastrulation d. Membrane that surrounds and protects the embryo</td>
</tr>
<tr>
<td>d.</td>
<td>8. Amnion e. Process in which the blastocyst attaches to the wall of the uterus</td>
</tr>
<tr>
<td>a.</td>
<td>9. Placenta f. Process of cell migration that produces three cell layers</td>
</tr>
</tbody>
</table>
10. Is the following sentence true or false? The first few cell divisions take place in the Fallopian tube.  

   true

11. After eight weeks of development, the embryo is called a(an)  

   fetus

12. Is the following sentence true or false? Most of the major organs and tissues are fully formed by the end of three months of development.  

   true

Later Development  (page 1019)

13. What changes occur during the last three months of fetal development?  

   The fetus doubles in mass, and the lungs and other organs undergo changes to prepare them for life outside the uterus.

Childbirth  (pages 1020–1021)

14. Is the following sentence true or false? The process of childbirth begins when the hormone calcitonin is released from the posterior pituitary gland.  

   false

15. The series of rhythmic contractions of the uterine wall that force the baby out through the vagina is known as  

   labor

16. What stimulates the production of milk in the breast tissues of the mother?  

   It is stimulated by the pituitary hormone prolactin.

Early Years  (pages 1021–1022)

17. Is the following sentence true or false? A baby’s birth weight generally triples within 12 months of birth.  

   true

18. Is the following sentence true or false? Infancy refers to the first year of life.  

   false

19. Circle the letter of each development that occurs during infancy.  

   a. Crawling  
   b. Walking  
   c. Appearance of first teeth  
   d. First use of language

20. Childhood lasts from infancy until the onset of  

   puberty

21. Is the following sentence true or false? Reasoning skills are not developed until adolescence.  

   false

22. Adolescence begins with puberty and ends with  

   adulthood

23. What produces the growth spurt that starts at puberty?  

   A surge in sex hormones produces the growth spurt.
Chapter 39, Endocrine and Reproductive Systems (continued)

Adulthood (page 1022)

24. Is the following sentence true or false? Adults reach their highest levels of physical strength and development between the ages of 25 and 35. ______ true ______

25. When do the first signs of physiological aging appear in most individuals? They appear in the 30s.

WordWise

Use the clues to help you identify the vocabulary terms from Chapter 39. Then, put the numbered letters in the right order to spell out the answer to the riddle.

Clues

Tube through which urine and semen are released from the body
Fertilized egg cell
Hormonelike substance that affects only nearby cells and tissues
Cluster of cells surrounding an egg in the ovary
Male gonad that produces sperm
Chemicals that travel through the bloodstream and affect the activities of other cells
Female gonad that produces eggs
Organ that nourishes the embryo
Process in which a blastocyst attaches to the wall of the uterus
Name given to the human embryo after eight weeks of development

Vocabulary Terms

| Tube through which urine and semen are released from the body | u r e t h r a 1 |
| Fertilized egg cell | z y g o t e 2 |
| Hormonelike substance that affects only nearby cells and tissues | p r o s t a g l a n d i n 3 |
| Cluster of cells surrounding an egg in the ovary | f o l l i c l e 4 |
| Male gonad that produces sperm | t e s t i s 5 |
| Chemicals that travel through the bloodstream and affect the activities of other cells | h o r m o n e s 6 |
| Female gonad that produces eggs | o v a r y 7 |
| Organ that nourishes the embryo | p l a c e n t a 8 |
| Process in which a blastocyst attaches to the wall of the uterus | i m p l a n t a t i o n 9 |
| Name given to the human embryo after eight weeks of development | f e t u s 10 11 12 |

Riddle: What controls the pituitary gland?

Answer: h y p o t h a l a m u s 1 2 3 4 5 6 7 8 9 10 11 12